

SOCIETIES AND ACADEMIES

LONDON

Royal Society, January 18.—“Residual Charge of the Leyden Jar.—II. Dielectric Properties of Various Glasses,” by J. Hopkinson. Communicated by Prof. Sir William Thomson, F.R.S.

The experiments appear to verify the fundamental hypothesis, viz., that the effects on a dielectric of past and present electromotive forces are superposable. Ohm's law asserts the principle of superposition in bodies in which conduction is not complicated by residual charge. Conduction and residual charge may be treated as parts of the same phenomenon, an after effect as regards electric displacement, of electromotive force. The experiments appear to show that the principle of Ohm's law is true of the whole phenomenon of conduction through glass.

February 1.—“The Meteorology of the Bombay Presidency,” by Charles Chambers, F.R.S., Superintendent of the Colaba Observatory.

This work consists of four parts—the first dealing with registrations of meteorological phenomena at the Colaba Observatory during a period of twenty-seven years; the second with moderately full observations at five military stations in the Bombay Presidency during a period of nineteen years; and the third with large numbers of observations from civil hospitals and revenue stations, being those of selected registers extending over various periods from not less than a fortnight up to a number of years; in this part the phenomena treated are temperature of the air, winds, and rainfall only; and the extent of territory to which the observations refer includes the whole of the Presidency, Sind, and the western half of Rajputana. In the fourth part are discussed the general distribution (as regards both space and season) of temperature and rainfall, and the variations of the wind; first with respect simply to the physical geography of the country, and then in combination with certain theoretical views, the elucidation of which, by means of the dynamical theory of heat and the kinetic theory of gases, occupies much space.

February 15.—“On Stratified Discharges.—III. On a Rapid Contact-Breaker, and the Phenomena of the Flow.” By William Spottiswoode, M.A., F.R.S.

In a paper published in the *Proceedings* of the Royal Society, vol. xliii, p. 455, I have described a form of contact-breaker designed for great rapidity and steadiness of action. It consisted of a steel rod which vibrated under the action of an electromagnet. As regards sharpness of break and steadiness of the striae, this instrument left little to be desired. But, as explained in the paper, an alteration in the current not only affected the steadiness directly, but also reacted on the break itself. In order to obviate this inconvenience, I devised another form of contact-breaker consisting of a wheel platinised at the edge, on which a platinum spring rests. In the circumference of the wheel a number (40 in the first instance) of slots were cut, and filled with ebonite plugs so as to interrupt the current. The breadth of the slots was about $\frac{1}{64}$ inch, and that of the teeth about $\frac{1}{5}$ inch. The wheel was connected with suitable driving gear, so as to give from 250 to 2,000 currents from the coil in each direction per second.

For some time the experiments were conducted with the platinum spring resting on the wheel; and the effects were varied by altering either the pressure of the spring or the velocity of the wheel; but it was found that actual metallic contact between the spring and wheel was not necessary, provided that a layer or cushion of conducting material were interposed. Such a layer was formed by a thin film of dilute sulphuric acid drawn out by a thread leading from a reservoir and resting on the wheel. The spring, which under these circumstances became unnecessary, was replaced by a point, the adjustment of whose distance from the wheel was simple. This arrangement gave excellent results, even when the number of currents per second was reduced in some cases to 250; added to which the unpleasant and disturbing noise of the friction was entirely avoided. Ultimately, however, I used a light wire in the place of the spring first mentioned.

With the contact-breaker here described effects similar to those produced by the rapidly-vibrating break were obtained. The striae were formed in a regular manner, and advanced or receded, or remained at rest, in a column usually unbroken so long as the velocity of the wheel was maintained without change.

With a view of ascertaining the nature of the distinction between the ordinary and the steady striae, careful observations were

made with the revolving mirror. It having been noticed that when the wheel-break moved slowly, ordinary or irregular striae were produced, and that when it moved rapidly, steady striae resulted, it seemed probable that the latter effect might be due to the short time of contact, and to the consequent absence of many of the features described in Part II. of these researches. This is, in fact, identical with the suggestion there made, that the fluttering appearance was due to the unequal duration of the striae themselves, and to the irregular positions of the points at which they are renewed at successive discharges of the coil. And such, in fact, proved to be the case; for as the speed of the wheel was increased, the duration of the discharges diminished; the image as seen in the mirror became narrower and simpler in its configuration, until, when the steady effect was produced, each discharge showed only a single column of striae of a width proportional to the apparent width of the slit. The proper motion, implied by the inclination of the individual striae to the vertical, was still perceptible, and was directed as usual towards the negative pole.

The phenomena of the flow may be considered to be due to the different positions taken up by the striae in successive discharges. If in each discharge the striae occupy positions in advance of those occupied in a previous discharge, the column will appear to advance; if the reverse be the case, they will appear to recede. If the positions remain unchanged, the column will appear stationary.

Experiments were instituted with a view of ascertaining the connection between the flow and resistance. Starting from a condition of current and break for which the striae were stationary, it was found that an increase of resistance, introduced generally in the primary circuit, produced a forward flow, i.e. from the positive towards the negative terminal, while under similar circumstances a decrease of resistance produced a backward flow. Furthermore, if after producing a forward flow the resistance be continually increased, the flow, after increasing in rapidity so as to become undistinguishable by the unassisted eye, gradually appears to become slower, and ultimately to reverse itself.

Another form of contact-breaker was also occasionally used. The principle upon which it was based was the sudden disruption of a thin film of conducting liquid by a discharge between the electrodes of a circuit.

As soon as the current passes, the fluid between the plate and point will be decomposed, and electrical continuity broken. This done, the fluid flows back again, and continuity is restored.

February 22.—“On a New Form of Tangential Equation,” by John Casey, LL.D., F.R.S., Professor of Higher Mathematics in the Catholic University of Ireland.

“Addition on the Bicircular Quartic,” by A. Cayley, LL.D., F.R.S., Sadlerian Professor of Mathematics in the University of Cambridge.

Geological Society, March 7.—Prof. P. Martin Duncan, F.R.S., president, in the chair.—The Rev. Ebenezer Davies, William Davies, and Henry Davis Hoskold were elected Fellows, and George Garves Brush, Professor of Mineralogy in the Sheffield School of Science, Yale College, Newhaven, Connecticut, Prof. A. L. O. Descloizeaux, of Paris, Prof. E. Renevier, of Lausanne, and Count Gaston de Saporta, of Aix en Provence, Foreign Correspondents of the Society.—The following communications were read:—On the vertebral column and pelvic bones of *Phiosaurus evansi* (Seeley), from the Oxford Clay of St. Neot's, in the Woodwardian Museum of the University of Cambridge, by Harry Govier Seeley, F.L.S., Professor of Geography in King's College, London. In this paper the author described some bones obtained by J. J. Evans in the lower part of the Oxford Clay at Eynsbury, near St. Neot's. They consisted of thirty-seven vertebrae, twenty-one of which are cervical, and apparently complete that series. These presented the characters of the cervical vertebrae of the typical *Phiosaurus* of the Kimmeridge Clay. The remains of the pelvis included a pubic bone showing a close correspondence in form with those of the *Phiosaurus* of the Kimmeridge Clay of Ely, and an ischium.—Supplementary notes on the fauna of the Cambridge Greensand, by A. J. Jukes-Browne, F.G.S. This paper was supplementary to one communicated to the Society by the author in 1875, in which he maintained that the Upper Greensand does not extend further in a northwesterly direction than West End Hill, near Cheddington, in Buckinghamshire, that the Cambridge Greensand is merely a nodule-bed at the base of the Chalk Marl, resting unconformably upon denuded Gault, to the upper part of which the greater portion of the fauna belongs, and that the

remainder of the fauna, belonging to the deposit itself, consists of species proper to the Chalk Marl rather than to the Upper Greensand. The object of the paper was to indicate certain additions to, and corrections in, the list of fossils upon which these conclusions were supported. The following Gault species were indicated as not previously identified in the Cambridge Greensand:—*Nautilus arcuatus*, Desh.; *N. inequalis*, Sow.; *Turritiles elegans*, D'Orb.; (?) *T. emericianus*, D'Orb.; *Ornithopus histocheila*, Gardn.; *Brachystoma angularis*, Seeley; *Turbo pictetianus*, D'Orb.; *Pleuronomaria regina*, Pict. and Roux; (?) *P. itieriana*, Pict. and Roux; *Pecten raulinianus*, D'Orb.; *P. subacutus*, D'Orb.; and *Lima rauliniana*, D'Orb. The author described as new species:—*Turritiles nobilis*, *Nautilus*, sp. nov., *Natica levisirata*, *Nerita nodulosa*, and *Lima interlineata*, and noted several corrections in the nomenclature adopted in his former list.—On the beds between the Gault and Upper Chalk, near Folkestone, by F. G. Hilton Price, F.G.S. The author described the characters presented by the beds between the Gault and Upper Chalk near Folkestone, indicated the fossils contained in them and their range in this division of the Cretaceous series, and discussed the classification of the deposits and their equivalence with those recognised by other writers.

Anthropological Institute, March 13.—Mr. John Evans, F.R.S., president, in the chair. The President exhibited a hafted bronze celt, with its original wooden handle (which was covered with brass plates), found near Chiusœ.—Mr. Biddulph Martin exhibited some pottery, shells, and other remains from a supposed kitchen midden at Smyrna, which, the president pointed out, was of comparatively modern date. Some flint arrow-heads, scrapers, &c., from Ditchley, were exhibited by Capt. Dillon.—Mr. Hyde Clarke then read a paper on the Himalayan origin of the Magyar. The object of this paper was to show that languages of Nepal, &c., in the Himalayas, formerly called Subdravidian, are to be classified as Ugrian, and include Finnish, Magyar, Lap, and Samoyed affinities. In connection with the extension of the Ugrian area and possible centre to High Asia, the author entered on the question of the origin of the Magyars. After referring to the Magyar, Khun, &c., in the Himalayas, he proposed as a solution that the attack on Pannonda had been made by Avar or Khunzang traders from the Caucasus speaking a Vasco-Kolarian language, and with a main body of Ugrians, the language of whom prevailed on the extinction of the former. The author dissented from the Ugrian classification of Accad and Etruscan, giving other prehistoric examples for the Accad words in Lenormant, claimed by him and M. Sayous as Ugrian. Messrs. Bertin, Salymos, Rees, the President, and others, took part in the discussion.—The Director then read the following papers by Mr. Hector McLean:—On the Scottish Highland language and people, and on the Anglicising and Gaelicising of surnames.

Physical Society, March 3.—Prof. G. C. Foster, president, in the chair.—The following were elected members of the Society:—Mr. J. A. Fleming, Mr. P. le Neve Foster, and Mr. S. Hall.—Prof. Foster showed experimentally the polarisation of heat rays, employing two large Nicol's prisms of 2½ inch aperture, and a thermopile surrounded by a double jacket and connected with a Thomson galvanometer as arranged by Mr. Latimer Clark for showing very slight indications to an audience. When the principal sections of the prisms were at 90° to each other only a slight movement, doubtless due to an initial heating of one side of the pile, was observed; and the amount of the deflection was found to increase steadily up to about sixty divisions on the scale as the above angle was diminished. Prof. Foster exhibited the results of experiments made to determine the intensity of a source of heat by this means, and they were very concordant.—Mr. Latimer Clark then explained the arrangement of the galvanometer used. The image of an arrow-head or other form of index projected by means of a limelight at the further end of the room traverses a telescopic object-glass about two feet distant from the lamp and falls on a square silvered plate of glass suspended from the needle of a Thomson galvanometer, which is rendered steady in the ordinary way by a platinum spade in water. The reflected image then traverses the whole length of the room and falls on a large scale placed in front of the audience, and, by such an arrangement, the instrument may be at any distance from the scale, and yet the image will not be unduly magnified. A method is employed for bringing the needle rapidly to rest. A few thermo-electric couples are placed above the lamp chimney, thus being kept constantly hot, and the terminals are united by a wire which is coiled several times round the galvanometer;

the circuit is closed at the moment when this subsidiary current will tend to neutralise the motion of the needle.—Prof. Guthrie incidentally mentioned that the difficulty experienced in separating the fibres of a cocoon thread may be obviated by boiling the thread in carbonate of potash, when the natural resin is saponified and the fibres may be easily split.—Mr. Wilson then explained some difficulties he has met with in constructing a Holtz electrical machine, especially with reference to the windows and armatures, and he exhibited two machines which he recently made, from one of which a spark five or six inches in length can be obtained; this apparatus is so arranged that it can be taken entirely to pieces and packed in a very moderate-sized case. After carefully pointing out the difference between an ordinary machine and the Birch machine, he proceeded to consider the theory of the Holtz machine, and explained how he was led to construct an instrument in which there were no windows, the armatures being placed on the face of the fixed plate next to the moving plate, but the result was not satisfactory. He then made the larger machine provided with six fixed and six moving plates, and the windows were replaced by holes ¼ inch in diameter traversed by short pieces of tape glued to the paper armatures. The initial charging of the armatures is effected by means of a disc of ebonite fixed to the main axis of the machine, which is lightly held by the fingers and caused to rotate. Electricity is thus generated and points projecting towards it and communicating with points in the neighbourhood of the armatures cause them to become charged; after this, electricity is generated with great rapidity.—Prof. MacLeod gave some details concerning the working of a large Holtz machine which he drives by a turbine. He finds that after it has been in action for nearly an hour a much greater force is required to work it, and he suggested a theory in explanation of this phenomenon. By keeping the machine dry under a glass shade reversing effects are entirely avoided as well as the necessity for varnishing the plates.

Entomological Society, March 7.—J. W. Dunning, F.L.S., vice-president, in the chair.—Mr. Douglas exhibited a specimen of the Longicorn Beetle, *Monohammus sutor*, brought to him alive, having been captured in a garden in the Camden Road; also a melanic variety of *Orthosia suspecta*, taken at Dunkeld.—Mr. Hudd exhibited some interesting varieties of British Lepidoptera taken near Bristol and in South Wales; amongst them were *Lycena alexis*, *Sphinx ligustri*, and *Boarmia repandata*, the latter a black variety.—Mr. Champion exhibited specimens of *Cardiophorus rufipes*, a species new to Britain, taken by Mr. J. Dunsmore, near Paisley; also a British example of *Aphodius serafa* from the collection of Mr. Dunsmore, who unfortunately had no note of its locality.—The Secretary exhibited a specimen of an Isopod Crustacean which had been forwarded to him by Mr. J. M. Wills, surgeon, s.s. *City of Canterbury*, who stated that it was found occasionally parasitic on the flying-fish, and generally close to the pectoral fins. Mr. Douglas read an extract from a letter from Dr. Sahlberg, who had recently returned from an excursion to the neighbourhood of the Yenisei River and the extreme north of Siberia, from whence he had brought a large number of insects, principally Coleoptera and Hemiptera. Amongst the Hemiptera were one *Aradus*, one *Calocoris*, two *Orthotylus*, one *Orthops*, one *Pachytoma*, one *Anthocoris*, one *Acomphocoris*, five *Salda*, and one *Corixa*, which appeared to be hitherto unknown. The species of *Salda* were from the extreme north, in Tundra territory.—The Secretary read a paper by Mr. W. L. Distant, on the geographical distribution of *Danaïd archippus*, a North American butterfly which has recently been taken in the south of England.

Mineralogical Society, March 14.—Mr. H. C. Sorby, F.R.S., president, in the chair.—The following papers were read:—On a simple method for roughly determining the index of refraction of small portions of transparent minerals, by H. C. Sorby, F.R.S.—This can be effected by having a small graduated scale attached to the body of the microscope, by means of which the thickness of the crystal and the displacement of the focal point can be easily measured. From these data the index of refraction can be at once calculated with sufficient accuracy to make the result valuable in determinative mineralogy.—On a serpentine from Japan, by A. H. Church, M.A.—Notes on Vauquelinite from Scotland, and Cantonite or Harrisite from Cornwall, by Thomas Davies, F.G.S.—On an easily constructed form of reflecting goniometer, by S. B. Hannay, F.C.S.—On a peculiar form of quartz crystals from Australia, by Rev. J. M. Mello, F.G.S.—On certain black quartz crystals from Boscawell Down, Cornwall, by

J. H. Collins, F.G.S. The black colour is due to minute crystals of schorl.—On quartz including oxides of iron, by William Vivian.—On the magnetic constituents of minerals and rocks, by J. B. Hannay.—On the water contained in minerals, by J. B. Hannay.—On the Nordenskjöld iron masses from Greenland, by K. T. V. Steenstrup, translated by Mr. Rohde, one of the Danish expedition. The author contends that the iron is a natural constituent of the basalt, and not of meteoric origin.

Institution of Civil Engineers, March 13.—Mr. George Robert Stephenson, president, in the chair.—His Majesty the King of the Belgians was elected by acclamation an honorary member. The paper read was on the transmission of motive power to distant points, by Mr. H. Robinson, M. Inst. C.E.

MANCHESTER

Literary and Philosophical Society, December 4, 1876.—Charles Bailey in the chair.—Notes on a botanical excursion in the Aberdeenshire Islands in July, 1876, by Mr. Thomas Rogers.

December 26, 1876.—A notice of some organic remains from the schists of the Isle of Man, by E. W. Binney, president, F.R.S., &c.

January 9.—E. W. Binney, F.R.S., F.G.S., president, in the chair.—On the poisonous properties of yew-leaves, by James Bottomley, D.Sc.—On the luminous sulphides of M. Ed. Becquerel, by William Thomson, F.R.S.E.—On the types of compound statement involving four classes, by Prof. W. K. Clifford, M.A., F.R.S. Communicated by Prof. W. S. Jevons, M.A., F.R.S.

January 23.—Results of the monthly observations of the magnetic dip, horizontal force, and declination made at the magnetic observatory of the Owens College, from January, 1874, to December, 1876, inclusive, by Prof. Thomas H. Core, M.A. Communicated by Prof. Balfour Stewart, LL.D., F.R.S.

GENEVA

Physical and Natural History Society, February 1.—M. Alphonse Favre presented a geological map of the Canton of Geneva on the scale of $\frac{1}{250,000}$, intended to enlighten agriculturists on the management of the soil for their various crops.—Prof. Schiff described the researches he had made on the properties of nicotine as a poison, and on the part played by the liver in such poisoning.

February 15.—M. E. Renevier, professor at Lausanne, exhibited to the Society his geological map of Vaudois Alps, on the scale of $\frac{1}{250,000}$, as also several sections which complete it. It includes principally the mass of the Diablerets and the neighbouring spurs on the right bank of the Rhone.—Prof. Wartmann showed a small apparatus intended to prove the impulse which an induction spark in a rarefied gas is capable of giving in the direction of its length.—M. Raoul Pictet described various experiments made by himself, and proving the great facility with which sulphuric acid is diffused through caoutchouc.

PARIS

Academy of Sciences, March 19.—M. Peligot in the chair.—The following papers were read:—Observations of temperature at the Museum of Natural History, during 1876, with electric thermometers placed at depths of 1 metre to 36 metres under ground, as also in air and under grass-covered and bare ground, by MM. Becquerel. The results are nearly the same as were obtained before. General Morin, remarking that at only 10 to 12 metres depth he found a nearly constant temperature of 11° , suggested the use of underground air, drawn through pipes, to produce a constant temperature where it might be required (as for conservation of meat, &c.).—On the decomposition of bioxide of barium *in vacuo*, at the temperature of dark red, by M. Boussingault. The whole of the oxygen could be thus extracted. On removing the source of heat the bioxide was reconstituted. Bioxide of barium, then, cannot exist *in vacuo* at a dark red heat.—Physical and mechanical actions of incandescent and strongly compressed gases from combustion of powder. Application of the facts to certain characters of meteorites and bolides, by M. Daubrée. The facts of experiment seem to explain:—(1) the alveolar cavities or cupules in meteorites; (2) the peculiar clouds, smoke, or dust, which follow the disappearance of the incandescent mass; (3) the dust of cosmic origin which is thus expanded in our atmosphere, not only by combustion and volatilisation, but by pulverisation at a high temperature.—On the fundamental invariants of the binary form of the eighth degree, by Mr. Sylvester.—On the palæontological origin

of trees, shrubs, and bushes indigenous in the south of France, that are sensitive to cold in severe winters, by M. Martins. He considers them to be the survivors of the flora which covered those parts during the Tertiary period. We have here plants exotic as regards *time*, while other plants are exotic as regards *space*. At Montpellier and Marseilles the annual average of absolute minima of temperature are -9.23° and -5.95° respectively.—On the experiments made at Pégny by the canton of Geneva, by M. Bouley. He had erroneously given the Swiss Federal Government the credit of the experiments.—M. Hebert was elected member in the section of Mineralogy in room of the late M. Ch. Sainte-Claire Deville.—On the phosphorescence of organic bodies, by Mr. Phipson. *Après* of a recent note, he calls attention to his memoir on noctilucine, the first organic body known to be phosphorescent by slow oxidation, like phosphorus in the mineral kingdom.—Propositions of algebra and geometry deduced from consideration of the cubic roots of unity, by M. Appell.—On the curvature of surfaces, by M. Serret.—On a problem comprising the theory of elimination, by M. Ventéjols.—On the suspension of water in a vessel closed below by a tissue with large meshes, by M. Plateau.—On a singular fact of production of heat, by M. Olivier.—On the reform of some processes of analysis used in the laboratories of agricultural stations and observatories of chemical meteorology; first part, Ammonimetry, by M. Houzeau. His method is to use stable vinous red litmus, which will reveal free ammonia in solution in water containing only $\frac{1}{100,000}$ and even $\frac{1}{1,000,000}$ of its weight of that substance. The proportion is determined by pouring into the litmus-coloured liquor a weak titrated acid till disappearance of the original red.—On the preparation of crystallised acetate of magnesia, and on the fermentation of this salt, by M. Patrouillard.—On a simple mode of production of certain mono-, bi-, and tri-chlorised acids, by M. Demarcay.—Transformation of normal pyro-tartaric acid into dibromo pyrotartaric and dibromo-succinic acids, by MM. Reboul and Bourgois.—Action of chlorochromic acid on anthracene, by M. Haller.—On the constitution of pseudo-purpurine; continuation of researches on the colouring matters of madder, by M. Rosenstiehl. Pseudo-purpurine is sufficiently unstable to produce by its partial destruction the other colouring matters in madder (alizarine excepted).—Experiments on muscular tonicity, by M. Carlet. A muscle generally contracts after section of a nerve, before final relaxation. This is due, the author says, to the increased excitability of the nerve. In rare cases, where the nerve is cut without excitation (at one of Bridge's "nodes" perhaps), relaxation begins at once. Elongation immediately after section is due to *rigidity* not *flaccidity*, the extensor muscles being stronger than the flexors.—On the modifications in the egg of phanerozoic medusæ before fecundation, by M. Giard.—On the age of elevation of the Margeride, by M. Fabre.—On the formation of thunderstorms, by M. Zundel.—Clinical and therapeutical researches on epilepsy and hysteria, by M. Bourneville. From two analyses of portions of liver from an epileptic patient who had taken, in four months, forty-three grammes of ammoniacal sulphate of copper (and died of pulmonary tuberculosis $2\frac{1}{2}$ months after cessation of the treatment), the total amount of copper in the liver was estimated at 236 milligrammes and 250 mm.

CONTENTS

	PAGE
PALMÉN ON THE MIGRATION OF BIRDS	465
OUR BOOK SHELF:—	
Bottomley's "Dynamics; or, Theoretical Mechanics, in Accordance with the Syllabus of the Science and Art Department" . . .	467
LETTERS TO THE EDITOR:—	
Evolution and the Vegetable Kingdom.—J. S. G.; THOMAS COMBER	467
The Rocks of Charnwood Forest.—REV. T. G. BONNEY; E. HILL . . .	470
Southern Double Stars.—ROBT. L. J. ELLERY	470
Ship's Chronometers.—PARKINSON AND FRODSHAM (With Illustration)	470
Lowest Temperature.—REV. R. ABBAY	471
Meteor.—W. AINSLIE HOLLIS; J. H.	471
DR. SCHLEIMANN ON MYCENÆ	471
FERTILISATION OF FLOWERS BY INSECTS, XVI. By Dr. HERMANN MÜLLER (With Illustrations)	473
RECENTLY PROPOSED IMPROVEMENTS IN MUSICAL INTONATION. By ALEXANDER J. ELLIS, F.R.S.	475
ON PHOTO-CHEMICAL PROCESSES IN THE RETINA. By Prof. ARTHUR GAMGEE, M.D., F.R.S.	477
OUR ASTRONOMICAL COLUMN:—	
The Cape Astronomical Results, 1871-1873	478
Variable Stars	478
Biela's Comet in 1805	479
NOTES	479
SOCIETIES AND ACADEMIES	482